Trend Study 22-10-03

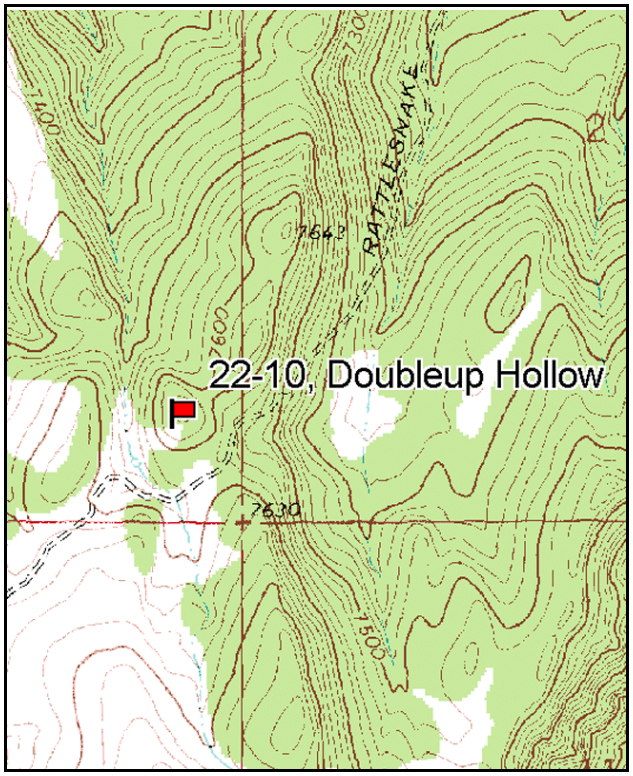
Study site name: Doubleup Hollow . Vegetation type: Mountain Brush .

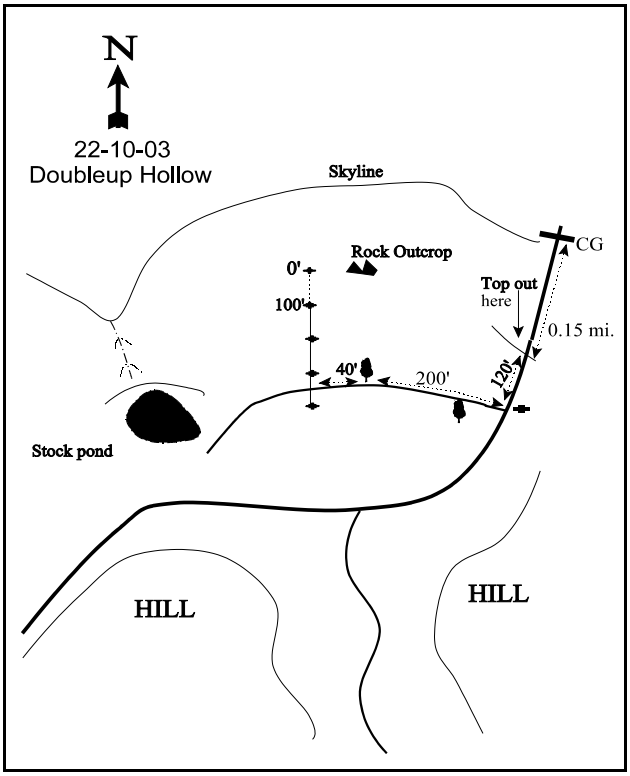
Compass bearing: frequency baseline 168 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Start from the cattleguard in front of the Chevron Station on the west side of the I-15 interchange at the south end of Beaver. Turn left onto the frontage road and go 0.7 miles south, then 1.6 miles west. Go past the turnoff to the Beaver International Airport 0.2 mile to a corner then 0.2 miles south to an intersection. Turn right, paralleling a fenceline and proceed 1.7 miles west to an intersection. Turn left onto a major dirt road and follow this main road (also known as the Rattlesnake Trail) for 6.7 miles, keeping to the right at all forks. At the livestock pond, keep right again and go 1.45 miles to the cattleguard. Continue 0.15 miles to a half high fencepost. From the fencepost, go 300 feet on a faint road forking off to the right. The 300-foot stake is just off of the faint road on the right side of the road. The 300 ft stake is rebar tagged #7075.





Map Name: Greenville Bench

Diagrammatic Sketch

Township 31S , Range 8W , Section 3

GPS: NAD 27, UTM 12S 4221812 N, 347658 E

DISCUSSION

Doubleup Hollow - Trend Study No. 22-10

This study samples a moderately high deer winter range on the north end of the Black Mountains. It is located on BLM administered land southwest of Beaver. Because this site lies at the upper elevations of the area, it could have year round use by resident deer, depending on the weather. The vegetation in the hollow is a mixture of open patches of sagebrush interspersed with pinyon, juniper, and curlleaf mountain mahogany. The area slopes moderately (10-15%) to the south at an elevation of 7,600 feet. This site receives light use with only 18 deer days use/acre (44 ddu/ha) estimated in 1998 and 29 deer days use/acre (71 ddu/ha) being estimated from pellet group transect data collected in 2003. In the past, hedging on the browse plants reflected use by both deer and livestock, but there was no livestock sign encountered in 1998 or 2003.

Large rock outcrops and the high percentage of rocks and pavement on the surface indicates the rockiness of the subsurface soil horizons. The upper soil is grayish brown, fine-textured, and loosely compacted. Soil analysis indicates a clay loam texture with a neutral pH (6.6). Effective rooting depth was estimated at nearly 13 inches in 1998. At a depth of approximately 10-12 inches there is an apparent hardpan or compacted layer. Phosphorous levels in the soil profile measure 7.1 ppm and may be limiting as 10 ppm is thought to be minimal for normal plant development. Vegetation and litter cover aid in soil stabilization and keep erosion to a minimum. Bare soil has been very low in all years. The soils were rated stable from an erosion condition class index in 2003.

The browse component is abundant and dominated by bitterbrush and mountain big sagebrush. These two species contributed about 3/4 of the total browse cover on the site in both 1998 and 2003. Bitterbrush is the most preferred species although utilization has shifted from moderate-heavy in 1985 and 1991 to light-moderate in 1998 and 2003. Percent decadence has been fairly low for all readings and was estimated at 16% in 2003. The proportion of young plants in the population was moderate in 1998 (13%) and 2003 (9%). Vigor has been mostly normal throughout the bitterbrush population for all surveys. In 1998 and 2003, bitterbrush showed abundant flowering, although annual leaders were noted as being few in 2003. Bitterbrush annual leader growth averaged 1.6 inches in 2003. In the past, the sagebrush was identified as both black sagebrush and mountain big sagebrush. In 2003, all sagebrush were classified as mountain big sagebrush. In 1985, it was reported that the sagebrush was producing a large amount of seed, which did not become established due to dry conditions. Density of sagebrush was estimated at about 4,000 plants/acre in 1998 and 2003. Reproduction was low in both years, while use was light to moderate. Percent decadence increased from 25% in 1998 to 40% in 2003. Poor vigor was displayed in 11% of the population in 1998 and 14% in 2003. Annual leader growth for sagebrush averaged 1.6 inches in 2003.

Other forage species present but in lower numbers include curlleaf mountain mahogany, Gambel oak, and snowberry. Point-center quarter data from 2003 estimated 28 Utah juniper trees/acre and 132 pinyon trees/acre. In 1998, line intercept canopy cover for Utah juniper was estimated at 2% and 8% for pinyon. In 2003, pinyon canopy cover increased to just over 11%, while juniper remained about the same.

The herbaceous understory has fair diversity yet poor production. Bottlebrush squirreltail has been the most abundant perennial species in all years, but it has also declined with each reading. Less abundant perennial grasses include bluebunch wheatgrass, blue grama, a *Carex*, prairie junegrass, Indian ricegrass, and mutton bluegrass. Most of the perennial herbaceous plants are found growing under the protection of shrubs. Cheatgrass is scattered throughout, but it is small statured. It significantly decreased in nested frequency in 2003. Forbs are rather scarce. All forbs combined to provide less than 1% average cover on the site in 1998 and 2003.

1985 APPARENT TREND ASSESSMENT

The soil appears stable and well-protected from erosion. However, the rocks on the surface are easily moved by disturbances such as trampling and trails. Erosion channels are easily formed. Large sagebrush openings still occupy much of the surrounding land, but these openings are apparently getting smaller. The relative abundance of the various browse species is slowly changing and the increase of pinyon and juniper indicates an overall slightly downward trend. The composition of grasses and forbs is fair and appears stable.

1991 TREND ASSESSMENT

The soil trend is slightly downward with slight declines in basal vegetation cover and litter cover, and a slight increase in bare ground. Browse trend for the key species is down. Sagebrush and bitterbrush experienced losses in their respective populations with corresponding increases in their decadence rate. The proportion of the plants displaying poor vigor increased for both species, and percent young declined. Sum of nested frequency for both grasses and forbs has also declined indicating a slightly downward trend.

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - slightly down (2)

1998 TREND ASSESSMENT

The soil trend is stable with only slight changes in percent rock, pavement, and bare ground. Erosion is only slight with adequate vegetation and litter cover to protect the soil. The browse trend is stable. The decrease in bitterbrush is mostly because of the much larger sample size giving more accurate estimates of shrub densities which characteristically have discontinuous and/or clumped distributions. Also, the number of dead plants in the population can only explain about 18% of the decrease. Utilization by wildlife or livestock is significantly lower at this time than previously reported. Percent decadence and the percentage of plants exhibiting good vigor have improved since 1991 for both bitterbrush and sagebrush. Sagebrush cover for sagebrush is moderately high at an estimated 24% and may negatively affect the herbaceous understory production. The herbaceous understory trend is stable. Perennial grass sum of nested frequency has slightly declined while perennial forb sum of nested frequency has increased, offsetting the losses in the grasses.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

2003 TREND ASSESSMENT

Trend for soil is stable. Erosion remains minimal, and basic cover categories have changed very little. Trend for browse is stable. Mountain big sagebrush and bitterbrush have fairly stable populations. Use remains light to moderate for both. Percent decadence increased for both species, but the proportion of the population displaying poor vigor remains about the same as in 1998. Sagebrush may decline in the future unless reproduction improves as there is a moderate amount of decadent, dying plants in the population. Trend for the herbaceous understory is down. Continued declines in nested frequency for perennial species is a definite concern on this site which has had a sparse understory from the beginning. The abundance of browse, including the increasing density of pinyon and juniper trees, coupled with periods of drought have negatively impacted the herbaceous component.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down (1)

HERBACEOUS TRENDS --
Management unit 22 , Study no: 10

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron spicatum	6	11	18	7	.35	.16
G	Bouteloua gracilis	6	12	6	-	.01	-
G	Bromus tectorum (a)	-	-	$_{b}$96	$_{a}$65	1.78	.68
G	Carex spp.	6	6	17	12	.26	.21
G	Koeleria cristata	8	6	3	11	.00	.07
G	Oryzopsis hymenoides	9	7	10	-	.02	-
G	Poa fendleriana	1	5	9	4	.30	.06
G	Poa secunda	-	-	-	-	-	.00
G	Sitanion hystrix	$_{c}$140	$_{bc}$113	$_{ab}$78	$_{a}$70	1.53	1.01
Total for Annual Grasses		0	0	96	65	1.78	0.68
Total for Perennial Grasses		176	160	141	104	2.49	1.53
Total for Grasses		176	160	237	169	4.27	2.21
F	Arabis demissa	1	6	12	3	.05	.00
F	Astragalus spp.	2	-	1	1	.00	.00
F	Chaenactis douglasii	$_{b}$23	$_{a}$7	$_{ab}$6	$_{a}$-	.07	-
F	Cryptantha spp.	12	11	12	1	.08	.00
F	Cymopterus spp.	-	-	7	4	.01	.03
F	Descurainia pinnata (a)	-	-	3	9	.00	.19
F	Epilobium brachycarpum (a)	-	-	$_{b}$9	$_{a}$-	.05	-
F	Erigeron pumilus	4	-	4	-	.06	-
F	Eriogonum umbellatum	-	-	-	3	-	.03
F	Gayophytum ramosissimum(a)	-	-	$_{a}$-	$_{b}$35	-	.09
F	Lupinus argenteus	$_{a}$-	$_{a}$-	$_{b}$21	$_{a}$-	1.44	-
F	Lygodesmia spinosa	1	4	-	2	-	.00
F	Machaeranthera canescens	$_{b}$10	$_{a}$-	$_{ab}$4	$_{a}$-	.01	-
F	Microsteris gracilis (a)	-	-	6	-	.01	-
F	Penstemon spp.	4	-	4	6	.04	.21
F	Petradoria pumila	-	-	4	1	.38	.03
F	Phlox longifolia	3	2	2	3	.01	.03
F	Senecio multilobatus	1	2	-	-	-	-

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
Total for Annual Forbs		0	0	18	44	0.06	0.28
Total for Perennial Forbs		61	32	77	24	2.18	0.36
Total for Forbs		61	32	95	68	2.25	0.64

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 22 , Study no: 10

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia nova	3	0	.03	-
B	Artemisia tridentata vaseyana	87	82	23.73	16.68
B	Cercocarpus ledifolius	1	2	.41	.41
B	Gutierrezia sarothrae	1	3	-	.00
B	Juniperus osteosperma	2	2	1.70	.38
B	Mahonia repens	1	3	.01	.03
B	Opuntia spp.	3	3	-	-
B	Pediocactus simpsonii	0	1	-	-
B	Pinus edulis	2	4	6.09	11.06
B	Purshia tridentata	50	47	13.92	11.08
B	Symphoricarpos oreophilus	5	5	1.29	1.16
Total for Browse		155	152	47.20	40.82

CANOPY COVER, LINE INTERCEPT --
Management unit 22 , Study no: 10

Species	Percent Cover	
	'98	'03
Artemisia tridentata vaseyana	-	13.88
Cercocarpus ledifolius	-	.35
Juniperus osteosperma	2.40	2.09
Pinus edulis	8.39	11.30
Purshia tridentata	-	11.96
Symphoricarpos oreophilus	-	1.25

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 22 , Study no: 10

Species	Average leader growth (in) '03
Artemisia tridentata vaseyana	1.6
Purshia tridentata	1.6

POINT-QUARTER TREE DATA --
Management unit 22 , Study no: 10

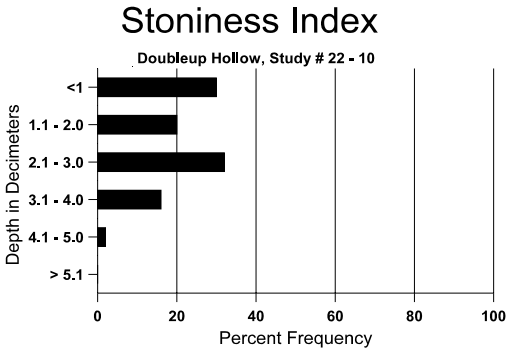
Species	Trees per Acre '98	Trees per Acre '03	Average diameter (in) '98	Average diameter (in) '03
Juniperus osteosperma	26	28	4.5	5.4
Pinus edulis	125	132	4.3	5.4

BASIC COVER --
Management unit 22 , Study no: 10

Cover Type	Average Cover % '85	'91	'98	'03
Vegetation	3.75	3.25	45.72	40.59
Rock	9.75	14.25	12.25	10.68
Pavement	25.25	20.50	20.12	13.58
Litter	56.75	53.00	49.04	51.86
Cryptogams	0	1.00	.19	.45
Bare Ground	4.50	8.00	6.00	7.14

SOIL ANALYSIS DATA --
Management unit 22, Study no: 10, Study Name: Doubleup Hollow

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
12.7	64.8 (10.9)	6.6	44.0	27.4	28.6	2.7	7.1	204.8	0.8



PELLET GROUP DATA --
Management unit 22 , Study no: 10

Type	Quadrat Frequency	
	'98	'03
Rabbit	27	20
Elk	2	-
Deer	36	8

Days use per acre (ha)	
'98	'03
-	-
-	-
18 (44)	29 (71)

BROWSE CHARACTERISTICS --
Management unit 22 , Study no: 10

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia nova											
85	**4933**	66	600	2733	1600	-	28	1	32	18	11/16
91	**3265**	-	66	1733	1466	-	29	8	45	35	8/21
98	**120**	-	-	60	60	-	0	0	50	33	10/13
03	**0**	-	-	-	-	-	0	0	0	0	-/-
Artemisia tridentata vaseyana											
85	**2399**	133	266	1133	1000	-	53	11	42	6	20/17
91	**2265**	-	66	1066	1133	-	50	0	50	38	20/24
98	**3900**	220	120	2820	960	1240	22	0	25	11	22/30
03	**4100**	-	40	2400	1660	1620	22	3	40	14	24/28
Cercocarpus ledifolius											
85	**0**	200	-	-	-	-	0	0	-	0	-/-
91	**66**	-	66	-	-	-	0	0	-	0	-/-
98	**20**	-	-	20	-	-	0	0	-	0	48/53
03	**40**	-	20	20	-	-	0	0	-	0	55/52
Gutierrezia sarothrae											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**333**	-	-	333	-	-	0	0	-	0	10/8
98	**20**	-	20	-	-	-	0	0	-	0	-/-
03	**100**	-	-	100	-	-	0	0	-	0	9/10
Juniperus osteosperma											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**40**	-	20	20	-	-	0	0	-	0	-/-
03	**40**	-	20	20	-	-	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Mahonia repens											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**120**	-	20	100	-	-	0	0	-	0	-/-
03	**140**	-	-	140	-	-	0	0	-	0	3/6
Opuntia spp.											
85	**0**	-	-	-	-	-	0	0	0	0	-/-
91	**0**	-	-	-	-	-	0	0	0	0	-/-
98	**80**	-	20	60	-	-	0	0	0	0	5/14
03	**140**	-	-	80	60	-	0	0	43	43	7/13
Pediocactus simpsonii											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**20**	-	-	20	-	-	0	0	-	0	4/4
Pinus edulis											
85	**133**	-	133	-	-	-	0	0	-	0	-/-
91	**133**	-	133	-	-	-	0	0	-	0	-/-
98	**60**	-	60	-	-	-	0	0	-	0	-/-
03	**100**	-	60	40	-	20	0	0	-	0	-/-
Purshia tridentata											
85	**4265**	466	1266	2933	66	-	39	45	2	2	24/26
91	**2599**	66	333	1800	466	-	64	23	18	5	27/51
98	**1540**	180	200	1260	80	200	32	1	5	1	34/45
03	**1360**	-	120	1020	220	180	28	3	16	6	34/50
Quercus gambelii											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	34/26
Symphoricarpos oreophilus											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**160**	-	-	160	-	-	13	0	-	0	12/25
03	**260**	-	120	140	-	20	38	0	-	0	22/43